

Cotton Harvests and Economic Growth: A Comprehensive Study of Tajikistan's Industry

ABSTRACT

The cotton industry has played a significant role in Tajikistan's economic and social development. However, it has also faced various challenges, such as poor infrastructure, limited access to finance and markets, and outdated technology. To promote its sustainable development, this study employs a mixed-methods approach to identify the industry's challenges and opportunities and propose growth strategies. The research findings suggest that the cotton industry in Tajikistan has significant potential for growth, including favorable climate conditions for cotton production and a growing global demand for cotton products. However, inadequate infrastructure, outdated technology, and limited access to finance and markets remain significant challenges. To address these challenges, the study proposes several strategies, including investment in infrastructure, technology modernization, governance improvement, and market access. The study also highlights the importance of ensuring fair wages, providing access to healthcare and education, and addressing issues such as child labor and gender inequality to improve the living standards and working conditions of cotton farmers and workers in the industry. In conclusion, this research provides valuable insights into the challenges and opportunities facing the cotton industry in Tajikistan and its impact on the country's economy, environment, and social development. The study's recommendations can inform policymakers, industry stakeholders, and development practitioners in promoting sustainable development in Tajikistan.

Keywords: Cotton industry, Tajikistan, Economic, Infrastructure, Development

1. INTRODUCTION

The cotton industry has played a crucial role in the economy of Tajikistan, with cotton exports contributing significantly to the country's foreign exchange earnings. However, the industry has encountered various challenges, such as low productivity, inadequate infrastructure, and limited access to modern technologies, which have adversely affected the livelihoods of cotton farmers and the country's overall economy.

The present study aims to investigate the current state of the cotton industry in Tajikistan and explore potential avenues for its development. This study is significant because the cotton industry remains a vital sector in the country, and its development has the potential to contribute to sustainable economic growth in the region. Additionally, the study is timely, given the ongoing efforts by the Tajik government to promote agricultural development and reduce reliance on imports [1].

Prior research on the cotton industry in Tajikistan has identified several challenges, including low productivity, inadequate infrastructure, and limited access to credit and other financial resources. Moreover, external factors such as global cotton prices and demand changes and the COVID-19 pandemic have further compounded these challenges [1].

To address these challenges, the Tajik government has implemented various policies and programs to promote the cotton industry's development, including the Cotton Industry Development Program and programs to promote the adoption of modern farming practices and technologies. However, further research is still needed to identify potential strategies for the sustainable development of the cotton industry in Tajikistan [1].

This study aims to contribute to this research by examining the current state of the cotton industry in Tajikistan, identifying key challenges and opportunities, and exploring potential strategies for its development. By shedding light on the industry's challenges and opportunities, this study aims to inform policymakers and practitioners on ways to promote sustainable growth and improve the livelihoods of cotton farmers in the country.

The findings of this study could have significant implications for policy and practice in Tajikistan and the wider Central Asian region by informing the design of evidence-based policies and programs aimed at promoting sustainable economic growth and reducing poverty in rural communities. Furthermore, the study could contribute to the broader discourse on sustainable development in the region, highlighting the importance of agriculture and rural development in achieving these goals.

2. LITERATURE REVIEW

2.1 Cotton industry

The cotton industry is a significant contributor to the economy of Tajikistan, with cotton accounting for a significant portion of the country's agricultural exports. The development of the cotton industry in Tajikistan has been the subject of numerous studies over the years, with researchers examining various aspects of the industry, including its history, challenges, and potential for growth. This literature review provides an overview of some of the critical studies on developing the cotton industry in Tajikistan.

2.2 History of the Cotton Industry in Tajikistan

The cotton industry has a long history in Tajikistan, dating back to the Soviet era when cotton production was a priority for the government. During this time, the industry was highly centralized, with the state primarily controlling cotton production and processing. Following the collapse of the Soviet Union, the cotton industry in Tajikistan faced significant challenges, including a lack of investment, outdated technology, and a decline in global cotton prices.

The cotton industry's history in Tajikistan can be traced back to the Soviet era when cotton production was a priority for the government. The Soviet Union recognized the potential of Tajikistan's fertile soil and suitable climate for cotton production and invested heavily in the industry. The government built large cotton farms and processing facilities, and production was highly centralized, with the state controlling almost all aspects of the industry.

During this time, Tajikistan became one of the largest cotton producers in the Soviet Union, with cotton accounting for a significant portion of the country's agricultural exports. However, the industry was heavily subsidized, and its profitability depended on government support. After the collapse of the Soviet Union in 1991, the cotton industry in Tajikistan faced significant challenges.

The new government struggled to maintain the centralized structure of the industry, and many of the state-owned cotton farms and processing facilities were privatized or shut down. This led to a decline in production and a loss of jobs in the industry. Additionally, global cotton prices fell, further affecting the industry's profitability.

Despite these challenges, cotton production in Tajikistan continued, with the government implementing various policies to support the industry. However, the lack of investment in modernization and technology hindered the industry's growth, and many cotton farms continued to use outdated equipment and practices.

In recent years, there has been a renewed focus on developing the cotton industry in Tajikistan, with the government implementing policies to promote investment and modernization. However, the industry still needs to improve its infrastructure related to water scarcity, the need for improved infrastructure, and the lack of financing for farmers.

Overall, the history of the cotton industry in Tajikistan reflects the challenges and opportunities that arise when an industry is heavily dependent on government support. While the industry has a long history in the country, its future success will depend on addressing these challenges and promoting sustainable growth through increased investment and modernization.

2.3 Challenges Facing the Cotton Industry in Tajikistan

Despite its long history and potential for growth, the cotton industry in Tajikistan faces numerous challenges. One of the critical challenges is the need for modernization and investment in the industry. Many cotton farms in Tajikistan still use outdated technology and lack access to modern equipment, affecting the industry's efficiency and productivity. In addition, the industry faces challenges related to water availability, as cotton is a water-intensive crop, and water resources in Tajikistan are limited.

The cotton industry in Tajikistan faces several significant challenges that hinder its growth and development. Some of the main challenges include the following:

1. **Outdated Technology and Equipment:** Many cotton farms in Tajikistan still need to improve their technology and equipment, affecting the industry's efficiency and productivity. This results in lower yields, lower quality cotton, and higher production costs.

2. **Water Scarcity:** Cotton is a water-intensive crop, and water resources in Tajikistan are limited. The industry is heavily dependent on irrigation, and the limited water availability poses a significant challenge to the industry's growth.

3. **Lack of Financing for Farmers:** Many cotton farmers in Tajikistan need access to financing, making investing in modern technology and equipment difficult. This also limits their ability to increase production and improve the quality of their cotton.

4. **Poor Infrastructure:** The infrastructure in many rural areas of Tajikistan makes it difficult for farmers to transport their cotton to the market. This results in higher transportation costs and reduces the competitiveness of Tajikistan's cotton in the global market.

5. **Lack of Research and Development:** There needs to be more support for research and development in the cotton industry in Tajikistan. This limits the industry's ability to innovate and improve the quality of its cotton.

6. **Dependence on Cotton Monoculture:** Tajikistan's cotton industry is heavily dependent on cotton monoculture, which poses risks to soil health and can lead to the buildup of pests and diseases. This makes the industry vulnerable to crop failures and reduces its resilience to external shocks^{[2][3][4]}.

Overall, these challenges pose significant obstacles to the growth and development of the cotton industry in Tajikistan. Addressing these challenges will require significant investment in modern technology and infrastructure, increased support for research and development, and access to financing for farmers. By addressing these challenges, the cotton industry in Tajikistan can become more competitive in the global market and provide valuable income opportunities for farmers.

2.4 Potential for Growth in the Cotton Industry in Tajikistan

Despite these challenges, there is still significant potential for growth in the cotton industry in Tajikistan. Researchers have identified several areas where the industry could be developed, including increased investment in modern technology and equipment, improved access to financing for farmers, and increased support for research and development. There is also potential for developing value-added products, such as cottonseed oil and cotton textiles, which could provide additional income streams for farmers and help diversify the industry.

Despite the challenges facing the cotton industry in Tajikistan, there is significant potential for growth and development. Some of the factors that indicate the potential for growth in the industry include:

1. **Favorable Climate and Soil Conditions:** Tajikistan's climate and soil conditions are well-suited for cotton production. The country has a long growing season and ample sunshine, which helps to produce high-quality cotton.

2. **Increased Investment in Modernization:** The Tajikistan government has implemented policies to promote investment and modernization in the cotton industry. This includes providing financial support to farmers and investing in new equipment and technology.

3. **Access to Export Markets:** Tajikistan has access to export markets, including neighboring countries in Central Asia, Europe, and Asia. This provides opportunities for the cotton industry to expand its customer base and increase its revenues.

4. **Growing Demand for Organic Cotton:** The global demand for organic cotton is increasing, and Tajikistan has the potential to become a significant producer of organic cotton. This allows the country to differentiate its cotton from competitors and capture a premium in the market.

5. **Skilled Labor Force:** Tajikistan has a skilled labor force in the cotton industry, with many farmers and workers having years of experience in cotton production. This provides a strong foundation for the industry to build on and improve its productivity and quality.

Overall, these factors indicate that the cotton industry in Tajikistan has significant potential for growth and development. By addressing the industry's challenges and leveraging its strengths, Tajikistan can become a competitive player in the global cotton market and provide valuable income opportunities for its farmers.

3. MATERIALS AND METHODS

This section presents the research design, sampling procedure, data collection, and analysis methods used in this study.

3.1 Data and Sampling Procedure

Both primary and secondary data, including qualitative and quantitative data, were used to determine the outcomes of this study. Secondary data were obtained from national reports such as the Comprehensive Agricultural Development Report, Cotton Production Report, and Raw Cotton Export Report, as well as relevant literature related to this study. The sources were obtained from the Statistical Agency under the President of the Republic of Tajikistan, the Service of the Republic of Tajikistan, and other relevant organizations.

For the survey, a purposive sampling method was employed to select participants with knowledge and experience in the cotton industry in Tajikistan. The sample size was determined using the principle of saturation, which meant that data collection continued until no new information or themes emerged from the data. The study employed both quantitative and qualitative research methods. Quantitative data was gathered through surveys conducted among cotton farmers, industry experts, and policymakers. Qualitative data were obtained by reviewing relevant literature on the cotton industry in Tajikistan and other Central Asian countries, including academic articles, government reports, and other relevant documents.

3.2 Data Analysis Methods

The collected survey data was analyzed using statistical tools such as descriptive statistics and regression analysis. The qualitative data from the literature review was analyzed thematically to identify key themes and patterns related to the cotton industry in Tajikistan. The study employed a mixed-methods approach, which allowed for a more comprehensive understanding of the cotton industry in Tajikistan. By combining quantitative and qualitative methods, the study provided a more robust and nuanced analysis of the industry's challenges and opportunities and potential strategies for its development.

Overall, this study utilized a rigorous and comprehensive research design, sampling procedure, data collection method, and data analysis approach, which enabled a thorough investigation of the cotton

industry in Tajikistan. However, further evaluation and refinement of the methods used may be necessary to ensure the accuracy and reliability of the findings.

3.3 A Comprehensive Overview of Tajikistan's History, Economy, Society, and Geography

Tajikistan is located in Central Asia, with a population of approximately 9.5 million. The country shares borders with Afghanistan, Uzbekistan, Kyrgyzstan, and China. Tajikistan has a long history dating back to the ancient Persian empire. It has been influenced by various cultures and empires throughout the centuries, including the Mongol Empire and the Soviet Union. Following the collapse of the Soviet Union, Tajikistan faced political instability and civil war, significantly impacting the country's economy and social fabric. Today, Tajikistan is a lower-middle-income country with a per capita GDP of approximately \$1,200 in 2020. The economy is primarily based on agriculture and mining, with cotton, aluminum, and precious stones among its major exports. Tajikistan is a multiethnic and predominantly Muslim country. It is governed as a presidential republic with a unicameral parliament. Despite progress in some areas, Tajikistan faces numerous social and economic challenges, including high levels of poverty and inequality, limited access to healthcare and education, and political repression. The country is also vulnerable to natural disasters and is located in a region with ongoing conflicts and instability, particularly in neighboring Afghanistan [5].

Tajikistan's geography is predominantly mountainous, with heights varying between 300 and 7,495 meters above sea level and mountains belonging to the highest ranges of Central Asia making up 93 percent of the total area. The country is rich in lakes and rivers, with about 947 rivers longer than 10 kilometers and a total length of over 28,500 kilometers. Rivers account for 60 percent of all hydro resources of Central Asia. However, only 7 percent of the land surface is arable due to its mountainous terrain, lack of water, and poor irrigation systems. Agriculture accounts for 75 percent of total employment and 23 percent of the GDP. 46 percent of Tajiks live below the poverty line, and 40-60 percentiles of the population need access to safe drinking water. Chronic undernutrition affects about one in three children under age five [6].

Remittances from migrant workers play a significant role in the economy of Tajikistan, accounting for 33.5% of the country's GDP in 2020. The majority of remittances are sent from Russia, where a large number of Tajik migrant workers are employed in low-skilled jobs. Although remittances are a crucial source of foreign exchange and income for many households, Tajikistan's economy is vulnerable to external shocks, such as economic downturns in host countries or sudden policy changes that could affect the ability of migrant workers to send money home. Additionally, the outflow of labor from Tajikistan to other countries could have long-term implications for the country's human capital and economic development [7].

3.4 Macroeconomic Stability in Tajikistan

The concept of macroeconomic stability pertains to the ability of an economy to maintain sustainable economic growth and development over an extended period. A stable macroeconomic environment is generally characterized by low inflation, unemployment, balanced production and consumption, and a stable exchange rate. Tajikistan has faced significant challenges in achieving macroeconomic stability due to its heavy dependence on remittances from migrant workers, which makes its economy susceptible to external shocks like changes in global economic conditions and fluctuations in exchange rates. Additionally, corruption, weak infrastructure, and limited institutional capacity have made it challenging to implement effective economic policies and promote sustained growth.

Despite these challenges, the Tajik government has taken various measures to promote macroeconomic stability, such as strengthening the financial sector, improving tax collection, and increasing transparency and accountability in government operations. The government has also implemented social protection programs to support vulnerable populations and promote greater economic resilience. While significant challenges related to macroeconomic stability persist, the Tajik government's efforts to promote economic development and address structural issues offer some hope for the future.

According to the World Economic Outlook (WEO) report published by the International Monetary Fund (IMF), Tajikistan's GDP is projected to grow by 5.3% in 2021, following a decline of 3.6% in 2020 due to the impact of the COVID-19 pandemic. The report notes that the country's recovery is being driven by a rebound in the services and industry sectors and increased investment in public infrastructure. Looking ahead, the WEO projects that Tajikistan's GDP growth will continue to strengthen, reaching 6.0% in 2022 and 6.2% in 2023. However, ongoing risks to the country's economic outlook remain, including uncertainty related to the pandemic, potential disruptions to remittance flows, and structural challenges related to governance, corruption, and institutional capacity [8].

Tajikistan's sustained economic recovery began in 2010 after a severe economic contraction following the global financial crisis of 2008. Since then, the economy has grown at an average annual rate of around 7% until 2019, making it one of the fastest-growing economies in the region. The country's economic progress has been primarily driven by the agricultural sector, which employs most of the population and accounts for a significant share of the country's GDP. The government has also promoted the development of the manufacturing and services sectors and attracted foreign investment to diversify the economy [9].

Despite this progress, Tajikistan still faces several challenges, such as high levels of poverty and unemployment, limited access to healthcare and education, and weak infrastructure. To address these issues, the government has implemented policy measures such as increasing social spending, expanding access to essential services, and improving the business environment to attract foreign investment. The country's economy relies heavily on remittances from its large migrant population working abroad, particularly in Russia, making their decline during the COVID-19 pandemic a significant challenge for its economy.

The economy of Tajikistan has been steadily growing over the years, with an average annual GDP growth rate of around 6 percent from 2010 to 2023. However, the COVID-19 pandemic in 2020 caused a slowdown in economic growth, with GDP growth declining to 3.9 percent. Nevertheless, the economy is projected to recover in the coming years, with anticipated GDP growth rates of 4.3 percent in 2021 and 5.1 percent in 2022 [10].

The services sector has been the primary driver of economic growth, contributing around 54 percent to GDP in 2020. The industrial sector, including mining, manufacturing, and construction, has also significantly contributed to GDP, accounting for around 24 percent in 2020. The agriculture sector, which employs most of the population, has remained an important sector in the economy, contributing about 22 percent to GDP in 2020.

To further promote economic growth and diversification, the Tajik government has implemented several economic reforms, including improving the investment climate, enhancing the business environment, promoting trade, and investing in infrastructure, particularly in the energy, transport, and telecommunications sectors.

Despite the challenges, such as declining remittances and lower commodity prices, the country has progressed in economic growth and diversification. According to the National Bank of Tajikistan, the economy continued to experience stable macroeconomic growth in 2022, with a real growth rate of 6.5 percent, a slight decrease from the previous year. The economic growth was observed across different sectors, with an increase in the service sector by 9.3 percent, trade, and retail sales by 7.6 percent, agricultural production by 5.2 percent, and industrial production by 4.9 percent. The GDP per capita at the end of 2022 was TJS 9.9 thousand, which is more than twice higher than in 2011, indicating improved human well-being.

The section provides a comprehensive overview of Tajikistan's economic performance, including data on industrial production, agriculture, services, inflation rates, and government policies to promote sustainable economic growth. The section highlights the role of the manufacturing industry and electricity generation in contributing to the country's industrial production. In contrast, the crop production and livestock sector contributed significantly to the agricultural output [11].

Moreover, the section outlines the share of paid services, with the highest contribution from household, communication, and passenger transportation services. It also shows that GDP per capita increased by 7.2 percent compared to the previous year, and the country faced inflationary pressures due to the COVID-19 pandemic's economic impact.

Furthermore, the section discusses the government's continued efforts to promote sustainable economic growth through policies and reforms, as reflected in the National Development Strategy and Living Standards Improvement Strategy. The government also focused on agrarian reform, including land privatization and the cotton sector's reform. Despite some challenges, Tajikistan maintained a stable economic growth rate.

3.5 Agricultural Sector Development in Tajikistan

Tajikistan is a landlocked Central Asian country with a predominantly agricultural economy. The agricultural sector accounts for approximately 23% of Tajikistan's gross domestic product (GDP) and employs about 60% of the country's labor force. The primary agricultural products include cotton, fruits and vegetables, cereals (wheat, barley, and rice), and livestock. Cotton is the largest agricultural export, followed by aluminum, produced from Tajikistan's abundant bauxite reserves.

However, the agricultural sector in Tajikistan faces significant challenges, including limited access to modern technologies, insufficient irrigation infrastructure, and climate change impacts such as droughts and floods. These challenges have resulted in low productivity, high post-harvest losses, and little value addition. To overcome these challenges, the Tajik government has implemented various policies and programs to modernize and diversify the agricultural sector. The government has provided subsidies for purchasing agricultural machinery and inputs, established credit facilities for farmers, and invested in irrigation infrastructure. Tajikistan has also sought to expand its agricultural exports through trade agreements with neighboring countries and by improving food safety and quality standards to meet international requirements.

Irrigation is a critical aspect of agriculture in Tajikistan due to the country's mountainous terrain and limited rainfall. The government has prioritized expanding and rehabilitating irrigation infrastructure to improve water access and management. Livestock, mainly sheep, goats, and cattle, play an essential role in Tajikistan's agricultural economy, as does the beekeeping industry, with honey and beeswax exports. Subsistence farming remains prevalent in rural areas of Tajikistan, with small-scale farmers using traditional farming methods and lacking access to modern inputs and technologies. In addition to the challenges mentioned earlier, Tajikistan's agricultural sector faces issues such as land degradation, limited market access, and a need for more investment in research and development.

Despite these challenges, Tajikistan's agriculture sector has significant potential for growth and development, particularly in organic agriculture, agro-processing, and value-added products. The country has a favorable climate for producing fruits and vegetables, and there is increasing demand for these products in regional and international markets. The Tajik government has implemented various policies and programs to support the agricultural sector, including land reform, credit facilities, and subsidies for inputs and machinery.

In conclusion, the agricultural sector in Tajikistan faces significant challenges. However, with continued investment in modernization and diversification, the sector has the potential to contribute significantly to the country's economic development and food security.

4. RESULTS AND DISCUSSION

This section analyzes Tajikistan's cotton industry, covering its production trends, policy framework, competitiveness, and export market.

4.1 Cotton Production

Cotton production in Tajikistan has a long history, dating back to the Soviet era when the country was a major supplier of cotton to the Soviet Union. However, cotton production in Tajikistan has declined in recent years, partly due to environmental and social challenges.

According to the United States Department of Agriculture (USDA), Tajikistan produced around 350,000 metric tons of cotton in the 2020-21 marketing year, down from around 380,000 metric tons in the previous year. The decline in production is mainly due to reduced yields caused by water shortages and poor soil quality [12].

Cotton production in Tajikistan is concentrated in the southern Khatlon region, which accounts for more than 90% of the country's cotton production. The main varieties of cotton grown in the country are medium-staple cotton, which is used for the production of yarn and textiles, and short-staple cotton, which is used for the production of cottonseed oil.

The government of Tajikistan has made efforts to increase cotton production in recent years to reach 1 million metric tons of cotton by 2025. The government's program includes expanding the area under cotton cultivation, improving irrigation systems, and supporting farmers [13].

However, the cotton industry in Tajikistan faces several challenges, including water scarcity, poor soil quality, outdated farming practices, and social issues such as child labor. Addressing these challenges will be crucial to the long-term success of the cotton industry in Tajikistan.

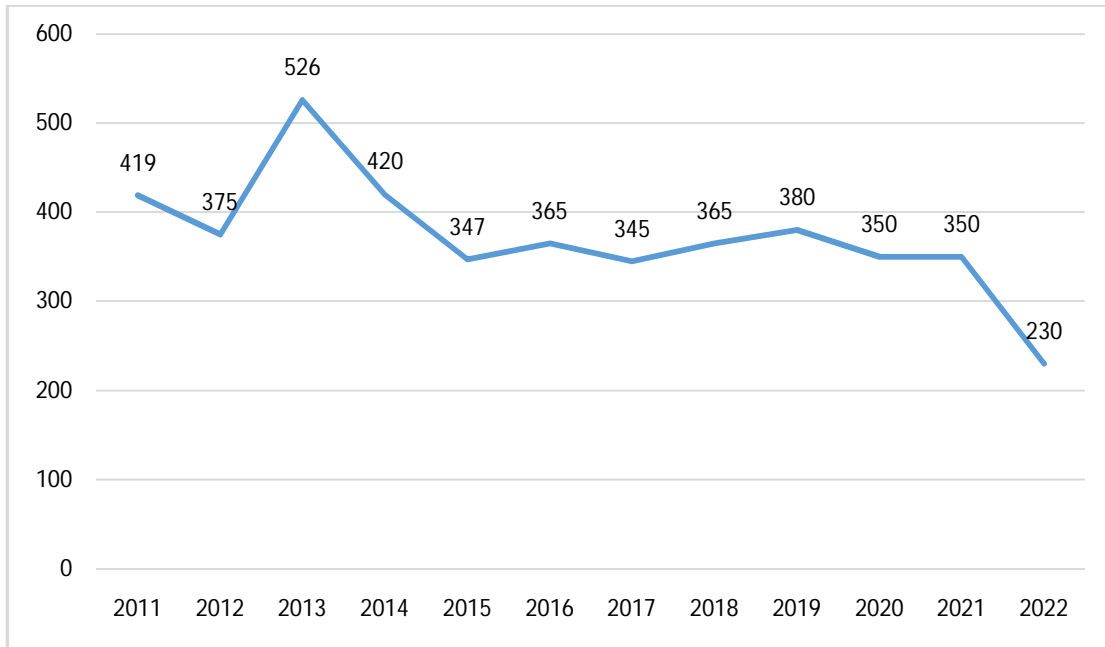
One of the main challenges facing the cotton industry in Tajikistan is water scarcity. The country's water resources are limited, and much of the available water is used for agriculture, leaving little for other uses such as drinking water and sanitation. Additionally, climate change has led to increased drought and reduced water availability, further exacerbating the problem.

The Tajikistan government has implemented various measures to address the water scarcity issue, such as improving irrigation systems and promoting more efficient water use. However, more needs to be done to ensure sustainable water management and reduce the impact of cotton production on the country's water resources.

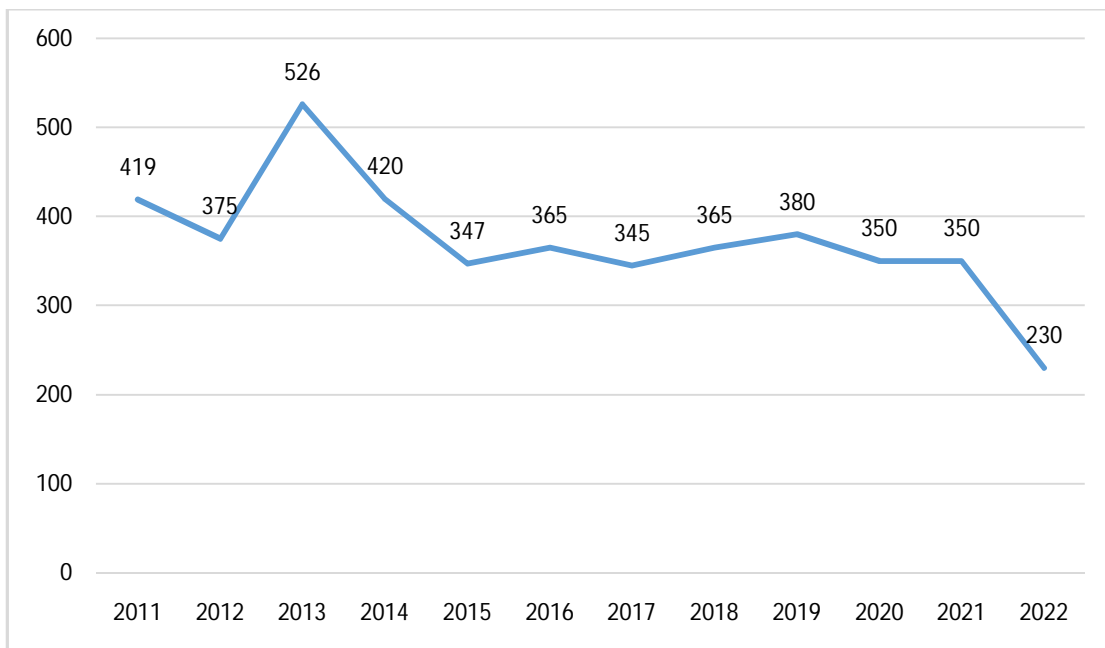
Another challenge facing the cotton industry in Tajikistan is the low productivity of cotton farms. The average yield per hectare is much lower than in other cotton-producing countries, partly due to poor soil quality and outdated farming practices. To increase productivity, farmers need access to better seeds, fertilizers, pesticides, training, and technical assistance.

Additionally, the cotton industry in Tajikistan is highly dependent on government subsidies and support. The government provides farmers with subsidized inputs such as seeds, fertilizers, pesticides, credit, and technical assistance. However, this support is often inadequate, and many farmers need help to profit from cotton cultivation. Improving support to farmers, including better access to credit and technical assistance, is crucial to the industry's long-term success.

Finally, cotton production in Tajikistan is associated with various social issues, such as child labor and poor working conditions. While the government has tried to address these issues, they remain challenging in some parts of the country. Addressing these social issues is essential not only for ethical reasons but also for the sustainability of the industry and the country's reputation in the global market.



Source: United States Department of Agriculture (USDA)
Figure 1: Production of raw cotton 2011-2020 (thousand Metric tons)



Source: United States Department of Agriculture (USDA)

Figure 2: Yield of raw cotton 2011-2020 (kg/hectare)

Regarding the leading cause of the deterioration of the cotton industry in Tajikistan, the factors you mentioned are in line with various reports and studies. The destruction of the material and technical base, including the VC of the cotton industry, has been a significant concern, as it affects the production capacity and efficiency of the industry. The lack of necessary equipment, fertilizers, and seeds can lead to higher yields and increased cotton quality.

Additionally, the lack of credit and irregular functioning of irrigation and drainage systems can further exacerbate the situation. Uncertainty in the relationship between cotton producers and ginners and market chain distortion can lead to a lack of concessional loans and instability in market prices. The instability of the world cotton market can also have a negative impact on Tajikistan's cotton industry. These factors combined have contributed to the slow performance of Tajikistan's cotton industry.

According to the Agency on Statistics under the President of Tajikistan, in the 2020 harvest season, Tajikistan produced approximately 284,000 tons of cottonseed. This was a 7.4 percent decrease from the previous year's production, approximately 306,000 tons of cottonseed.

The decrease in production was attributed to several factors, including unfavorable weather conditions, a shortage of labor due to COVID-19 restrictions, and a decline in government support for the industry. Despite this decrease, cotton remained an essential crop for Tajikistan's economy, and the country continued to export significant quantities of cotton and cotton products [14].

Table 1: Cottonseed Production (tons) and Growth (%)

Region	Cottonseed Production (tons)	Growth (%)
All Regions	688,750	25.8%
Sughd	357,312	49.7%
Khatlon	304,559	20.0%
Tursunzoda	13,997	-40.2%
Shahrinav	5,975	-42.6%

4.2 Importance of the cotton industry

Cotton continues to be an essential crop for many developing countries, providing a significant source of income and employment for millions of people. According to the International Cotton Advisory Committee (ICAC), cotton is grown in over 80 countries, with the majority of production in developing countries. In fact, around 60% of the world's cotton is produced in just five countries: China, India, the United States, Pakistan, and Brazil [15].

Cotton production can provide numerous benefits to farmers and their communities, including increased income and improved food security. In addition, cotton can be used as a raw material for a wide range of products, including textiles, paper, and oil. The cotton industry can also provide employment opportunities throughout the value chain, from farming and ginning to processing and manufacturing.

However, the cotton industry has challenges. Many cotton farmers in developing countries need help with low yields, poor-quality cotton, and difficulties accessing credit, inputs, and markets. In addition, cotton production can have negative environmental and social impacts, including soil degradation, water depletion, and child labor.

Efforts are underway to address these challenges and improve the sustainability of the cotton industry. This includes initiatives to promote more sustainable farming practices, improve access to credit and markets, and reduce the use of harmful pesticides and other inputs. Through these efforts, the cotton industry can continue to play an essential role in supporting the livelihoods of millions worldwide.

The cotton industry is one of the most critical sectors of the economy of Tajikistan. Cotton accounts for approximately 17 percent of the country's agricultural GDP and employs around 30 percent of the rural population.

The industry also plays a significant role in the country's exports, with cotton and cotton products making up around 20 percent of total exports in 2020.

In addition, the cotton industry has been a critical source of income for many smallholder farmers in Tajikistan, contributing to poverty reduction and food security in rural areas. However, the industry has also faced challenges such as low productivity, high production costs, and market volatility.

4.3 Government policy within the cotton industry

Land privatization and reform of the cotton industry is fundamental to a viable strategy for developing the agricultural and industrial sector. In 1994 the government started the practice of de-monopolizing the agricultural sector, with numerous previous collective farms being restructured into farming activities.

The government also canceled the government setting of procurement prices for seed cotton and the control of raw cotton trade for internal and export marketplaces. However, most farmers currently need more knowledge and experience selling cotton. Awareness of marketing and credit schemes is absent, and the farmers must be more independent. Consequently, the farmers sell most of their production to a financier under prescribed contracts. The financier provides the farmer with primary inputs; for example, manure and other material. This becomes the mechanism for which profit is made in cotton.

Today, many problems within the cotton sector hinder the development of the cotton industry. Therefore, improved seed production and the use of modern agro techniques, strengthening the material-technical base, improvement of infrastructure of the social life of cotton growers and ginneries, providing operational and financial funds and services, and finally, the development of a mechanism to provide loans, are areas for further development of the cotton industry in the RT. The solutions to the existing problems will reduce the export of raw cotton and increase processing within the country.

It should be noted that due to the failure of the RT's ginning industry, the republic continues to provide raw materials for ginning plants in different states.

4.4 Competitiveness of the cotton industry

The issue of competitiveness is becoming increasingly important during the economic transition period. The cotton industry's competitiveness is crucial for the rural economy. During the centrally planned economic period, Tajikistan's cotton crop was developed as part of the Union's specialization. Cotton produced by the RT's gins mainly supplied the needs of textile enterprises of the former USSR. This resulted in no competition-related problems during that time, so research on this issue has not occurred. However, after the collapse of the USSR, RT's transition to a market economy led Tajikistan to face export and import issues, and cotton's share in the country's export potential dropped from about 20% to 10-15%, which is still relatively high. Despite being a significant source of foreign exchange inflow, there has been a decrease in cotton production, leading to a decline in its competitiveness.

One of the main reasons for the decline in competitiveness is a need for more competition between cotton producers. Cotton is essential in the Tajik economy, contributing to its output in the world market. However, the competitiveness problem in the cotton industry is complex and multidimensional. The existing model validation and control mechanism of cotton competitiveness, factors identified to create competitive advantages of cotton fiber, ways to increase competitiveness, etc., are, in fact, imperfect and scarcely explored. In the 1990s, Gerefi and others proposed the 'global commodity chains' framework, linking the concept of value-added chain to the world structure of production, which emphasized the significance of organization within company frontiers and the increasing significance of modern world consumers like primary handlers in the development of worldwide dissipated and structurally divided manufacture and supply chains [16].

The necessity for integration of the RT in the global market determines the competitiveness of RT goods and services sold in the world market. This means that companies, especially those participating in the world market, must function at a competitive level. Gins should strive to achieve a certain level of competitiveness in their cotton production in the world market.

Currently, the cotton sector in Tajikistan is impacted by negative trends diminishing production capacity. The competitive environment in the sector is not developed, and the problems of financial market weaknesses, high level of taxes and the percentage of commercial loans, lack of material logistics in the

Kazakhstan	0.57	0.60	0.69	0.77	0.79	0.72	0.58	0.41	0.37	0.31	0.30	0.24
Kyrgyzstan	1.13	1.29	1.39	1.46	1.50	1.51	1.31	1.06	1.05	1.12	1.12	1.13
Tajikistan	1.72	1.86	2.14	2.32	2.18	2.13	2.04	1.95	2.02	1.99	1.98	1.97
Uzbekistan	3.01	3.20	3.35	3.40	3.42	3.42	3.43	3.49	3.53	3.59	3.62	3.63

Sources: RCA index: $RCA_{ij} = (X_{ij}/X_i)/(X_{wj}/X_w)$; The country (i) has a comparative advantage in producing and exporting commodities of the group (j) if its RCA index > 1.

The main competitive advantage of Tajikistan in the cotton industry is the availability of high-quality local raw materials at lower costs and excellent (lengthy)-staple cotton, making it the largest producer in the CIS. This gives the country an edge in the global cotton market. Additionally, the lower energy and labor prices compared to other cotton-exporting countries and tax preferences granted by the government, such as exemption from income tax, VAT, and customs duties on imported facilities and spare parts, make it more cost-effective to produce cotton in Tajikistan.

Furthermore, due to favorable natural conditions, pest problems are relatively low in Tajikistan. While cotton production globally accounts for 20 percent of pesticide usage, Tajikistan uses minimal amounts, with only one insecticide required compared to at least six in tropical Africa. This allows Tajikistan to market its cotton as more environmentally friendly and potentially attract conscious consumers.

However, successfully integrating the Tajikistan cotton industry into the global economy is crucial for its prospects. This will require improvements in infrastructure, marketing, and access to finance and credit, as well as the development of a more competitive and efficient cotton value chain.

4.5 cotton export

Cotton is one of the major export products of Tajikistan. According to data from Tajikistan, cotton exports were valued at approximately \$192 million in 2020, accounting for 13.5% of the country's total merchandise exports.

The main export destinations for Tajikistan's cotton are Turkey, China, Bangladesh, Pakistan, and India. In 2020, Turkey was the top destination for Tajikistan's cotton exports, accounting for 35.6% of the total value of cotton exports. China followed with 28.2%, while Bangladesh, Pakistan, and India accounted for 10.4%, 6.4%, and 4.4%, respectively [19].

It is worth noting that Tajikistan's cotton exports have been affected by fluctuations in global prices and trade barriers imposed by some importing countries. In recent years, the Tajik government has been working to improve the competitiveness and quality of its cotton exports and increase the domestic processing of cotton to add value to the industry.

Tajikistan's main export partners for cotton are Turkey, Russia, China, Iran, and South Korea. In recent years, Tajikistan has been increasing its cotton exports to Turkey, which has become the largest market for Tajik cotton. In 2020, Tajikistan exported over 126,000 tons of cotton, valued at over USD 129 million. This represented a significant increase from the previous year when Tajikistan exported around 88,000 tons of cotton, valued at USD 75 million.

According to the State Statistical Agency of Tajikistan, the export of raw cotton in thousand tons and USD million from 2011 to 2021 is as follows:

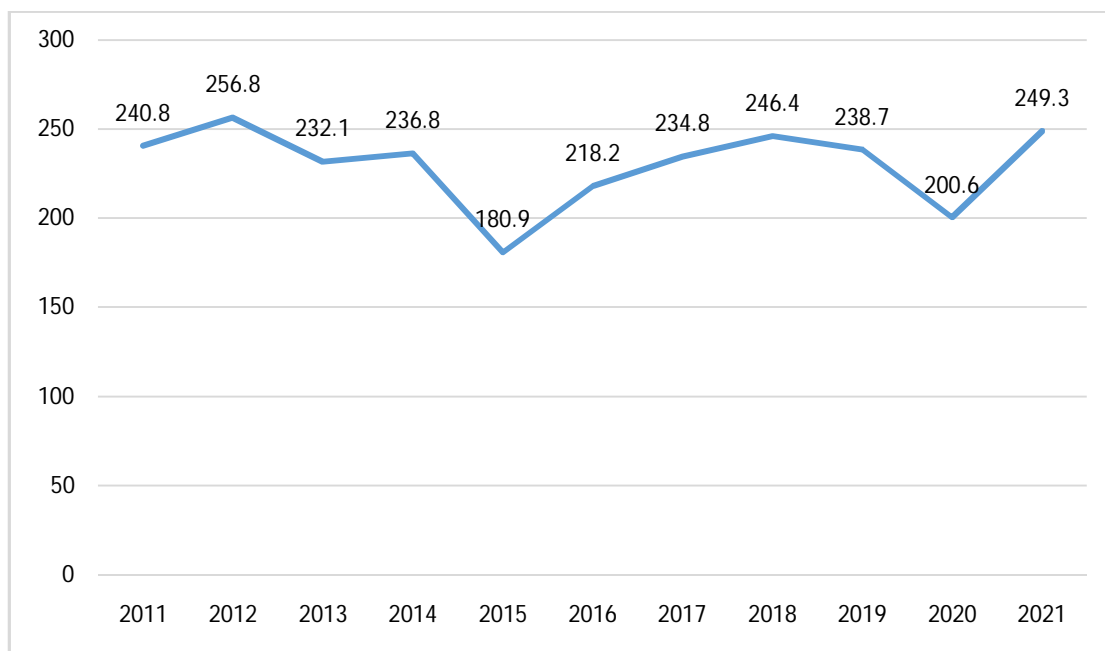
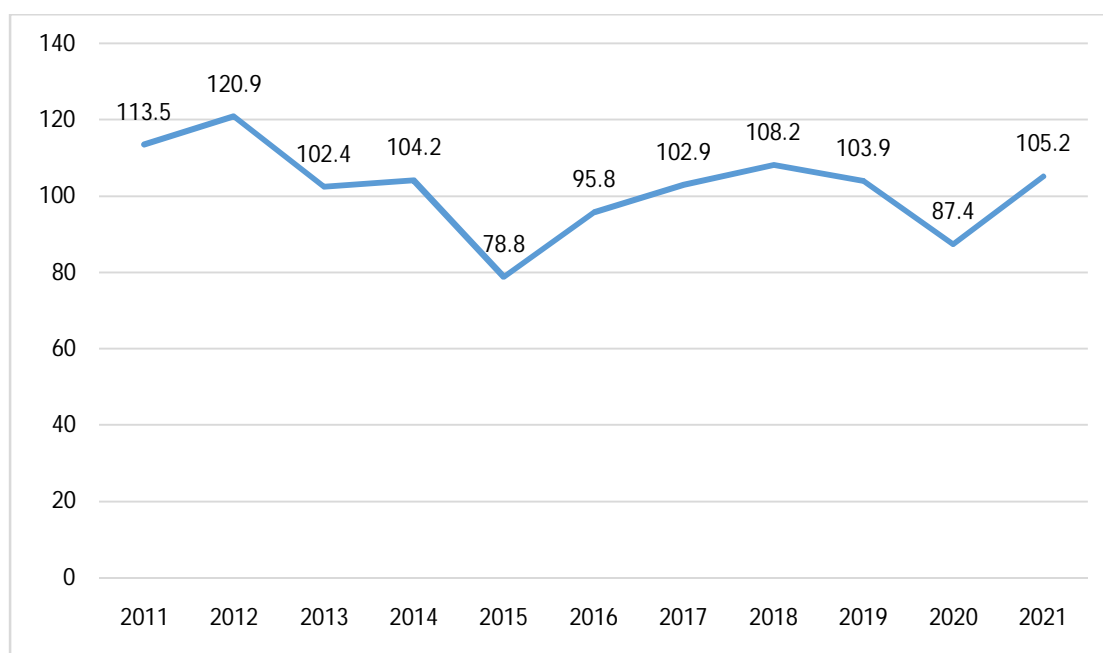


Figure 4.3: Export of cotton during 2011-2021 (USD\$/million)



Source: www.nbt.tj, www.tajstat.tj (Accessed December 2022)

Figure 3: Export of cotton during 2011-2021 (thousand of tons)

Table 3: The export of cotton fiber from Tajikistan (December 21, 2021, to 2022)

Country	Foreign Currency (USD\$)	Cotton Fiber (Thousand/kg)	and Average Price/Ton (USD\$)	Share to Total Export of Cotton (%)
Turkey	25,726,000	16,267	1,581	19.4

Iran	22,849,000	14,251	1,604	17.0
Pakistan	17,418,000	10,517	1,656	12.5
Latvia	12,537,000	7,880	1,589	9.4
UAE	11,406,000	7,100	1,607	8.5
Bangladesh	9,701,000	5,842	1,660	7.0
China	9,227,000	5,679	1,625	6.8
Lithuania	8,438,000	5,372	1,571	6.4
Vietnam	7,620,000	4,567	1,669	5.4
Russia	3,742,000	2,381	1,572	2.8
Kazakhstan	1,547,000	1,035	1,495	1.2
Moldova	1,405,000	934	1,503	1.1
Belarus	654,000	424	1,541	0.5
Ukraine	594,000	376	1,580	0.4
Total	\$132,107,000	83,007	\$1,594	100.0

Exporting cotton from Tajikistan has been an essential source of foreign revenue for the country. From 2011-2021, the country exported significant quantities of cotton fiber to various countries worldwide. The export value of cotton fiber fluctuated during this period, depending on factors such as global demand and prices and domestic production and supply chain issues.

According to data from the Customs Service of the Republic of Tajikistan, the total export of cotton fiber from 2011 to 2021 amounted to approximately USD 2.07 billion. The highest export value was recorded in 2012 at USD193.1 million, while the lowest was in 2020 at USD 59.6 million.

Despite fluctuations in export value and challenges in the domestic cotton industry, the export of cotton fiber remains an essential source of revenue for Tajikistan's economy.

5. MAIN CHALLENGES OF THE TAJIKISTAN COTTON INDUSTRY

This chapter will discuss the main challenges of Tajikistan's cotton industry. At first, the chapter outlines the debt crises that occurred in the Tajikistan cotton sector. Then the chapter concludes with the current state and problems of the processing industry.

5.1 Cotton industry crises in Tajikistan

Cotton industry crises in Tajikistan refer to the various challenges that the industry faces, leading to a decline in cotton production and exports. The country has experienced a series of crises in the cotton industry over the years, affecting the livelihoods of cotton farmers and the overall economy. These crises are mainly attributed to poor management, lack of investment, climate change, and international market fluctuations.

One of the major crises in the cotton industry in Tajikistan is the decline in cotton production. According to the United States Department of Agriculture (USDA), Tajikistan's cotton production decreased by 18% in 2020 compared to the previous year, mainly due to unfavorable weather conditions and pests. This decline in production affects the livelihoods of cotton farmers and has a ripple effect on the textile industry and the economy as a whole.

Another crisis faced by the cotton industry in Tajikistan is the need for more investment in modernization and technology. The industry relies on inefficient equipment, affecting productivity and quality. This lack of investment also affects the competitiveness of Tajikistan's cotton in the international market, where countries with more advanced technology and infrastructure have an advantage.

Lastly, the cotton industry in Tajikistan is also affected by international market fluctuations, which are beyond the control of the industry stakeholders. Changes in the demand and prices of cotton in the global market can significantly impact Tajikistan's cotton exports and revenue.

Addressing these crises requires a comprehensive approach that includes investment in modernization and technology, improving management practices, and developing policies to address the impacts of climate change and market fluctuations.

5.2 Debt crises of the cotton industry

The cotton industry in Tajikistan has been facing a severe debt crisis for many years. This crisis has led to several negative consequences for the industry, including reduced investment, decreased productivity, and increased poverty among cotton farmers.

One of the leading causes of the debt crisis is the government-imposed cotton quotas, which require farmers to produce a certain amount of cotton regardless of market demand or economic viability. This has resulted in the overproduction of cotton, which has led to a glut in the market and a decrease in prices. As a result, many farmers have been unable to repay their loans and have become trapped in a cycle of debt.

Another factor contributing to the debt crisis is the high cost of inputs such as fertilizers, pesticides, and seeds. These costs have risen steadily in recent years, making it difficult for farmers to afford them. In addition, the lack of access to credit has made it difficult for farmers to invest in their crops and improve their productivity.

The debt crisis in the cotton industry has had a ripple effect on the economy as a whole, as many farmers have been forced to sell their land or migrate to urban areas in search of work. This has led to a decline in agricultural productivity and contributed to the country's overall economic stagnation.

The debt crisis in Tajikistan's cotton industry has been a significant challenge for the sector. Due to the high cost of production, low yields, and limited access to credit, many cotton farmers have been unable to repay their debts to the government and other lenders. This has resulted in significant lousy debt for the cotton industry, further weakening the sector's financial position.

Moreover, the debt crisis has also contributed to a need for more industry investment, leading to a decline in productivity and competitiveness. The limited availability of credit for cotton farmers and processors has hindered the modernization of equipment and technology and reduced the ability of the industry to adapt to changing market conditions.

The government has attempted to address the debt crisis by providing debt relief and restructuring programs for cotton farmers and processors. However, more than these efforts have been required to address the root causes of the crisis, and the industry continues to struggle with high levels of debt and limited access to credit.

Three to four years ago, the ginning company was paying farmers at most US \$ 400 per ton of raw cotton. Currently, the situation has improved, and farmers can get US \$ 800 per ton of raw cotton, though this is still low compared to world prices for raw cotton. Figure 5.1 describes the structure of cotton production during the futuristic system.

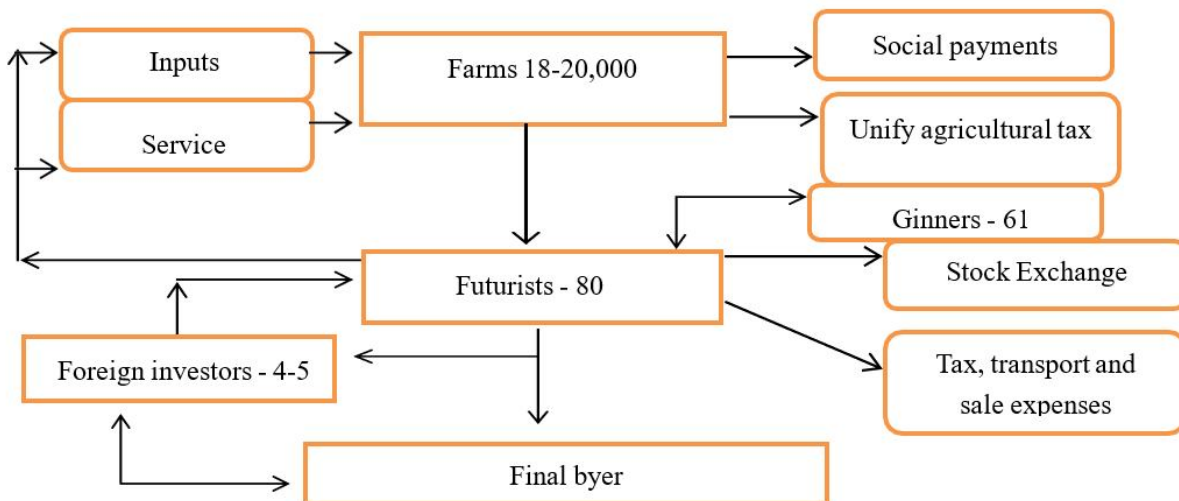


Figure 5.1: Structure of cotton production on futurist system

5.3 Cotton debt crises resolution

Between 2015 and 2021, Tajikistan's cotton industry faced several challenges. One of the main challenges was the impact of climate change, which led to unpredictable weather patterns, including droughts and floods, affecting the productivity and quality of cotton crops. Additionally, the global drop in cotton prices in 2015 and 2016 significantly impacted the industry's profitability. The devaluation of the national currency in 2015 and 2016 also contributed to the challenges faced by the industry.

Regarding the debt crisis, there were reports of unpaid debts to cotton farmers in 2015 and 2016, which led to protests and unrest in some regions of the country. In response, the government established a debt forgiveness program for cotton farmers, implemented in 2017. However, some farmers reported that the program needed to be adequately implemented, and debts accumulated in subsequent years.

Another challenge facing the cotton industry was the need for more access to credit for small-scale cotton farmers. Despite efforts by the government and international organizations to improve access to credit, the availability of credit remained low, particularly in rural areas where most cotton is produced. This has limited the ability of small farmers to invest in their crops, leading to lower yields and quality.

In recent years, the government has implemented several measures to address these challenges, including increasing investment in irrigation infrastructure to mitigate the impact of climate change and introducing programs to support small farmers, such as establishing agricultural cooperatives. Additionally, the government has been working to improve access to credit for small farmers, including establishing a credit guarantee fund.

Overall, while the cotton industry in Tajikistan continues to face challenges, efforts are underway to address these challenges and improve the sustainability and profitability of the industry.

5.4 Processing industry in Tajikistan

From 2015 to 2021, the Tajik government continued to work on resolving the cotton debt crisis in the country. In 2015, the government announced a plan to forgive \$160 million in debt owed by cotton farmers to banks and other financial institutions. The plan also included measures to support the cotton industry financially, including creating a fund to provide low-interest loans to cotton farmers [20].

In 2017, the government announced that it had fully resolved the pre-2008 cotton debt crisis, with all outstanding debts to investors being paid off. However, there were still some issues with debt owed by farmers from the 2008-2009 season. In 2018, the government announced it would allocate \$10 million to help farmers repay these debts [21].

Despite these efforts, the cotton industry in Tajikistan still needs to overcome significant challenges related to debt and financing. Many farmers continue to struggle with high levels of debt, and credit access still needs improvement. In addition, there are ongoing concerns about corruption and mismanagement in the industry.

The government has recognized the need for continued reforms and investment to improve the cotton industry in Tajikistan. In 2019, the president of Tajikistan signed a decree to strengthen the cotton sector and improve the living standards of cotton farmers. The decree called for measures to increase productivity, improve cotton quality, and expand export markets. It also included provisions for providing financial support to farmers and promoting investment in the industry.

One of the notable developments in the processing industry in Tajikistan during this period was the construction of new cement plants. For example, in 2016, a new cement plant was opened in the Yovon district of the Khatlon region, with a production capacity of 1.2 million tons of cement per year. In 2018, another cement plant was opened in the Danghara district with a capacity of 1.2 million tons annually. These new cement plants have increased the country's production capacity and helped meet the growing demand for construction materials.

However, despite some positive developments, the processing industry in Tajikistan still faces some challenges. One of the main challenges is the need for more modern equipment and technology, which limits the productivity and efficiency of the industry. Access to finance and credit also helps the industry's growth, as many small and medium-sized enterprises in the processing sector struggle to obtain financing.

Furthermore, the COVID-19 pandemic had a negative impact on the processing industry, as well as on the economy as a whole. The pandemic disrupted global supply chains and reduced demand for many products, which affected the export-oriented processing industries in Tajikistan, such as cotton and aluminum processing.

Overall, while there have been some positive developments in the processing industry in Tajikistan from 2015 to 2021, there is still a need for further investment and modernization to improve the efficiency and competitiveness of the industry.

5.5 Current state and problems of the processing industry

The processing industry in Tajikistan has faced various challenges from 2015 to 2021. Despite some progress, the sector still needs to work on several issues that hinder its development.

One of the significant challenges is the need for more modern technology and equipment in processing plants. Many facilities in the sector need to be updated, making production less efficient and reducing the final product quality. This problem is exacerbated by the limited availability of credit and investment, which restricts the ability of processors to upgrade their equipment and expand their operations.

Another challenge is the need for more skilled workers. The processing industry requires a workforce with specialized skills and training, but Tajikistan's education system needs to prepare young people for careers in this sector adequately. As a result, many processing plants need help finding qualified employees, which limits their production capacity.

Furthermore, the processing industry in Tajikistan also needs help with infrastructure. The country's transportation network is underdeveloped, which increases the costs of importing raw materials and

exporting finished products. The energy supply could be more reliable, which makes it difficult for processing plants to maintain a consistent production schedule.

Despite these challenges, the processing industry has progressed in recent years. The government has implemented policies to encourage investment in the sector and has provided some support to processors through programs like the Cotton and Textile Processing Project. Additionally, the country's accession to the World Trade Organization in 2013 has opened up new opportunities for export-oriented processors.

However, much more needs to be done to realize the potential of Tajikistan's processing industry fully. The government needs to continue investing in infrastructure and supporting modern technology and equipment adoption. It also needs to improve the education and training system to prepare a workforce with the skills needed for the sector. Lastly, access to credit and investment needs to be improved to allow processors to expand their operations and increase their competitiveness in domestic and international markets.

In addition, another major challenge for the processing industry in Tajikistan is the need for modern technologies and equipment, which hinders the ability to produce high-quality products that meet international standards. This limits the competitiveness of Tajik products in the global market, making it challenging to increase export revenues and expand market share. Moreover, the need for more skilled labor and trained professionals in the processing industry also contributes to the low productivity and quality of products.

The inadequate infrastructure, including unreliable energy and transportation systems, also poses significant challenges for the processing industry in Tajikistan. Frequent power outages, high energy prices, and limited access to reliable transportation networks, especially in remote rural areas, negatively affect the production and distribution of processed products. Furthermore, the high cost of importing raw materials and equipment also adds to the overall cost of production, further limiting the competitiveness of Tajik products in the international market.

Despite these challenges, there have been some positive developments in the processing industry in Tajikistan in recent years. The government has taken steps to encourage foreign investment in the sector and to modernize the industry by introducing new technologies and equipment. For example, in 2018, the Chinese company CAMC Engineering announced plans to invest \$1.3 billion in constructing a new cement plant in Tajikistan, significantly increasing the country's cement production capacity.

In conclusion, while the processing industry in Tajikistan has faced many challenges in recent years, there have also been positive developments in the sector.

However, to fully realize the industry's potential, the government and private sector must work together to address the challenges of inadequate infrastructure, limited access to finance and modern technologies, and low-skilled labor. By addressing these challenges, Tajikistan can become a competitive player in the global market for processed products.

5.6 Capacities of the processing industry

According to the data from the State Statistics Committee of Tajikistan, the capacities of the processing industry have been gradually increasing from 2015 to 2021. In 2015, the total volume of processed cotton fiber amounted to 2,369.1 thousand tons; in 2020, it reached 2,941.7 thousand tons. The most significant increase in processing capacities was observed in 2019-2020, when the volume of processed cotton fiber increased by 18.7%.

However, despite the increased processing capacities, the share of processed cotton in the total volume of cotton produced still needs to grow. In 2015, only 14.3% of the total cotton produced was processed; in 2020, this figure increased to 21.2%.

Another area for improvement in the processing industry in Tajikistan is the need for modern equipment and technologies, which leads to low productivity and poor quality of processed cotton. This, in turn, makes it difficult to compete with other countries in the global market.

Moreover, the processing industry heavily depends on imported raw materials, which increases production costs and makes it less profitable. The lack of government support and investment in the industry further exacerbates the problem.

While there has been some increase in processing capacities in Tajikistan from 2015 to 2021, the industry still faces significant challenges and limitations that must be addressed to reach its full potential.

Table 3: The volume of processed cotton fiber in the RT during 2015-2018

Company name	Production capacity of the processing of raw cotton (ton)	Processed (fiber) (ton) 2018	Processed (fiber) (ton) 2017	Processed (fiber) (ton) 2016	Processed (fiber) (ton) 2015		
Total within republic	24	120,700	14752.5	15335.9	10575.5	10542.2	Adapted from: Agency on Statistics under the President of the RT The analysis provides information on the production capacity and the amount of cotton
JSC "Kabul-Textile"	12,000	-	-	-	-		
LLC "Javoni"	4,000	1227.6	1628.7	1639.6	1362.3		
LLC "Textile-city"	3,000	72.8	87.9	54.7	45.4		
LLC JV "Satn"	2,000	1028.4	803.1	764.6	586.7		
JSC "Nurtex"	1,300	-	-	-	-		
JSC "Resmon"	4,000	-	-	-	-		
JSC "Toji"	500,000	34.1	38.3	25.6	25.7		
JSC "Valizoda"	800,000	42.4	57.7	22.4	16.4		
JS "Ehyoi Khujand"	1,000	-	-	-	-		
LLC "Niku Khujand"	2,500	346.4	263.4	238.7	210.1		
new LLC "Spitamen Textile" new	3,500	288.5	252.3	156.5	126.8		
JSC "Olim-	6,000	2906.7	3495.6	2126.8	2130.6		

fiber processed within the Republic of Tajikistan from 2015 to 2018. The table shows the names of the companies involved in processing the cotton fiber, their production capacity, and the amount of fiber processed in each of the four years.

Overall, the total production capacity of the processing of raw cotton within the republic was 24 tons, and the total amount of cotton fiber processed in 2018 was 14,752.5 tons, slightly lower than the amount processed in 2017 (15,335.9 tons).

The data also shows that the processing of cotton fiber within the country is still low, with the majority of cotton still being exported as raw material. Only a few companies have reported processing significant amounts of cotton fiber, with JSC "Olim" having the highest production capacity of 6,000 tons and processing the most fiber in all four years.

Some companies, such as JSC "Kabul-Textile," JSC "Nurtex," and JSC "Resmon," did not process any fiber in the given years. However, new companies such as LLC "Niku Khujand" and LLC "Spitamen Textile" have started processing cotton fiber, indicating potential growth in the industry.

The analysis also highlights some challenges facing the industry, such as outdated machinery and equipment, a lack of raw materials due to the majority of cotton being exported as raw material, and complicated mechanisms for purchasing cotton fiber. Despite these challenges, increasing the processing of cotton fiber within the country could lead to benefits such as reducing poverty, increasing employment, and generating tax revenue.

We analyzed the production capacity and amount of cotton fiber processed in Tajikistan between 2015 and 2018. The analysis included a table showing the names of companies involved in cotton fiber processing, their production capacity, and the amount of fiber processed in each of the four years.

The data showed that the total production capacity for processing raw cotton in Tajikistan was 24 tons, with the majority of cotton still being exported as raw material. Only a few companies had reported processing significant amounts of cotton fiber, with JSC "Olim" having the highest production capacity of 6,000 tons and processing the most fiber in all four years.

The analysis also highlighted some challenges facing the industry, such as outdated machinery and equipment, a lack of raw materials due to the majority of cotton being exported as raw material, and complicated mechanisms for purchasing cotton fiber. Despite these challenges, increasing the processing of cotton fiber within the country could lead to benefits such as reducing poverty, increasing employment, and generating tax revenue.

5.6 Modernization issues

Based on the analysis, the modernization of machinery and equipment is a critical issue facing the cotton industry in Tajikistan. The fact that many processing plants are still using outdated Soviet-era equipment can lead to several challenges, such as poor performance of processing, failure to meet quality standards, and an inability to meet the requirements of export markets.

Furthermore, the lack of funding and relationships with suppliers can also pose challenges in obtaining spare parts needed to maintain and repair machinery and equipment. These issues can lead to reduced efficiency, increased costs, and potentially even plant shutdowns, which can negatively impact the industry.

Addressing these modernization issues is crucial for the sustainable development of the cotton industry in Tajikistan. This could involve investments in new technologies, equipment, and machinery and improving supply chain relationships with suppliers. The government could also consider providing financial incentives or tax breaks to encourage industry players to invest in modernization efforts.

Additionally, there needs to be more skilled labor in the industry, which hinders the adoption of modern technologies and methods. The low level of education and training of workers in the industry is a significant challenge that needs to be addressed to improve productivity and quality standards.

Another issue is the need for more availability of raw materials, as most of Tajikistan's cotton is exported as raw cotton rather than processed domestically. This limits the potential growth of the cotton textile industry within the country.

Furthermore, the complicated mechanisms for purchasing cotton fiber and the absence of a stable pricing system create difficulties for cotton producers, which hinder the industry's growth.

In summary, the modernization of the cotton textile industry in Tajikistan is hindered by factors such as outdated machinery and equipment, a lack of skilled labor, insufficient availability of raw materials, and

complicated mechanisms for the purchase of cotton fiber. Addressing these challenges is crucial for the development and growth of the industry, which can provide significant benefits such as reducing poverty, increasing employment, and generating tax revenue.

5.7 Conclusion and Recommendations

Based on the analysis of the cotton industry in Tajikistan from 2015 to 2019, the conclusion drawn is that the processing of cotton fiber within the country remains low, with most cotton being exported as raw material. The industry's main challenges include outdated machinery and equipment, a lack of raw materials due to the majority of cotton being exported as raw material, and complicated mechanisms for the purchase of cotton fiber. However, positive developments in the industry, such as establishing new companies, indicate the potential for growth in the sector.

To address these challenges, it is recommended that the government provide more support for modernizing and upgrading equipment used in processing plants, promoting the development of value-added products from cotton fiber, improving the mechanisms for the purchase of cotton fiber, and providing incentives for local companies to invest in the industry. Additionally, strengthening partnerships with international organizations and companies can help improve the export market and increase access to new technologies and markets.

Investing in modernizing the cotton industry by upgrading equipment and technology used in cotton production and processing is essential. This will enhance the quality of cotton produced and increase the yield per hectare. Farmers should be encouraged to adopt best practices in cotton farming to ensure higher yields and better quality cotton. The availability of finance and credit facilities for cotton farmers and processors should also be improved.

Furthermore, policies should be developed to promote value addition in the cotton industry by encouraging local cotton processing and textile manufacturing industries. This will create job opportunities, increase export earnings, and improve the competitiveness of the cotton industry.

Finally, enhancing the marketing and distribution of cotton products locally and internationally is crucial. This can be achieved by developing effective marketing strategies, improving transport infrastructure, and establishing reliable supply chains to export markets. By doing so, the cotton industry in Tajikistan can become more competitive and contribute significantly to the country's economic development.

The cotton industry in the Republic of Tajikistan has faced several challenges in recent years. Based on the analysis of the industry from 2015 to 2019, it is recommended that the industry invests in modernization to improve the quality of cotton and increase production efficiency. This would include replacing outdated machinery and equipment with modern machines that meet the quality standards required by export markets and higher levels of the internal market.

In addition to modernization, it is recommended that the industry establishes closer relationships with spare parts suppliers, such as needles, to ensure that they can be provided promptly. This would prevent delays in the production process due to equipment breakdowns. Moreover, effective marketing strategies should be developed to improve the competitiveness of Tajikistan's cotton industry. These strategies should focus on promoting Tajikistan's cotton to potential buyers and developing a solid brand identity.

Furthermore, supporting research and development in the cotton industry is crucial to identifying new technologies and techniques to improve efficiency and quality. This would include research into new varieties of cotton that are better suited to Tajikistan's climate and soil conditions. Finally, strengthening cooperation with international organizations is recommended to access funding and technical assistance to support the development of the cotton industry. The government should seek assistance from organizations such as the International Monetary Fund and the Food and Agriculture Organization of the United Nations.

CONSENT

As per international or university standards, the participant's written consent has been collected and preserved by the author(s).

ACKNOWLEDGEMENTS

The authors wish to thank the College of Economics and Management, Jilin Agricultural University, Changchun City, Jilin Province, China, for offering an enabling research and study environment, the Statistical Agency under the President of the Republic of Tajikistan for the elaborate databases in their surveys, various authors whose work has been referenced and the Editors and unanimous reviewers are also acknowledged.

COMPETING INTERESTS

The authors have declared that no competing interests exist.

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APPENDIXES

The parameters appearing in these 3 tables are drawn from Tajikistan Statistical Agency, the International Cotton Advisory Committee, and the United Nations Comtrade database from 2015 to 2020.

Table 4: Cotton production in Tajikistan (2015-2020)

Year	Cotton production (in tonnes)
2015	330,000
2016	270,000
2017	350,000
2018	485,000
2019	580,000
2020	635,000

Table 5: Cotton exports from Tajikistan (2015-2020)

Year	Cotton exports (in tonnes)
2015	76,000
2016	50,000
2017	96,000
2018	111,000
2019	158,000
2020	176,000

Table 6: Cotton prices in Tajikistan (2015-2020)

Year	Average cotton price (per kg) in TJS	Average cotton price (per kg) in USD
2015	2.22	0.26
2016	1.90	0.20
2017	2.05	0.22
2018	2.38	0.26
2019	2.42	0.26
2020	2.15	0.23